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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/539,624 | 06/17/2005 | Naoya Matsuoka | 050340-0190 | 4578 |

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MCDERMOTT WILL & EMERY LLP
600 13TH STREET, N.W.
WASHINGTON, DC 20005-3096

| EXAMINER | |
|---|---|
| HAN, KWANG S | |
| ART UNIT | PAPER NUMBER |
| 1727 | |
| MAIL DATE | DELIVERY MODE |
| 10/14/2010 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/539,624 | MATSUOKA, NAOYA | |
| | Examiner | Art Unit | |
| | Kwang Han | 1727 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *16 September 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *18-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *18-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

**FUEL CELL SYSTEM WITH CONTROL OF MOISTURE-ADJUSTED GAS**

Examiner: K. Han SN: 10/539,624 Art Unit: 1727 October 13, 2010

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on September 16, 2010 has been entered. Claims 1-17 are cancelled. Claims 18-24 are added.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Claim Objections***

3. Claim 18 is objected to because of the following informalities: The word "freeing" should be "freezing". Appropriate correction is required.

***Claims Analysis***

4. Regarding limitations recited in Claims 18-24 which are directed to a manner of operating the disclosed device (e.g. "controller", "sensors", "moisture-adjusted gas generating mechanism" etc.), it is noted that neither the manner of operating a disclosed

device nor material or article worked upon further limit an apparatus claim. Said limitations do not differentiate apparatus claims from prior art. See MPEP § 2114 and 2115. Further, it has been held that process limitations do not have patentable weight in an apparatus claim. See *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969) that states "Expressions relating the apparatus to contents thereof and to an intended operation are of no significance in determining patentability of the apparatus claim."

***Claim Rejections - 35 USC § 103***

5. The claim rejection under 35 U.S.C. 103(a) as unpatentable over Mathias et al. in view of Busenbender et al., Suzuki et al., Nonobe, Ban et al., Gilbert, and Walsh on claims 1-17 is withdrawn, because claims 1-17 has been cancelled.

6. Claims 18-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mathias et al. (US 6376111) in view of Busenbender (US 2003/0039870) and Suzuki et al. (US 2001/0010872).

Regarding claims 18, 19, 22, and 23, Mathias discloses a fuel cell system comprised of the following:

- an anode (18) which contacts the fuel gas (2:30-31) ,
- a cathode (16) which contacts the oxidant gas (2:28-30),
- an electrolyte membrane (14) held between the anode and cathode (Figure 1),
- a moisture adjusted gas generating mechanism (2:54-3:7), and
- a programmable controller (44) (4:7-9).

Mathias is silent towards the measurement of temperature to control the humidity within the fuel cell and also determine target humidity based on a temperature of the fuel cells after power generation is halted.

Busenbender teaches sensors which can detect both an ambient temperature (outside temperature) or a fuel cell temperature [0006] to send a temperature-based control signal to a control system [0014] as part of a system for the benefit of avoiding of freezing water present in a fuel cell during periods of inactivity [Abstract] with respect to a predetermined threshold temperature [0017]. It would have been obvious to one of ordinary skill in the art at the time of invention to use a temperature sensor based control system with the controller of Mathias during periods of inactivity because Busenbender teaches and recognizes the need to avoid freezing of water in a fuel cell during periods of inactivity and low temperature.

Suzuki et al. teaches a control system [0033] which directs dry air to remove residual moisture directly to the fuel cell [0066], and thereby changing the humidity level, in a fuel cell system to prevent freezing [0043, 0048]. It would have been obvious to one of ordinary skill in the art at the time of the invention to provide controlled modification to target humidity levels within the controller of Mathias and Busenbender's fuel cell, because Suzuki teaches changing the humidity level in a fuel cell system allows for the prevention of freezing.

Regarding claim 20, Mathias discloses a sensor (42) which detects a wet condition of the fuel cell and the measurement of the resistance within the fuel cell assembly to determine the humidity level within the system (3:42-46) and the

recognition of the humidification to be in a nominal range so the membrane is not too dry or to be flooded (4:1-9).

Regarding claim 21, Mathias discloses test values at 50% relative humidity and 73% relative humidity which shows efficiency of the fuel cell is a function of the humidity of the fuel cell (5:38-6:8) teaching relative humidity is a result effective variable. It would have been obvious to one of ordinary skill in the art at the time of the invention to vary the relative humidity since it has been held that discovering the optimum ranges for a result effective variable such as relative humidity involves only routine skill in the art in the absence of showing of criticality in the claimed range (MPEP 2144.05) In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

7. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mathias et al., Busenbender, and Suzuki et al. as applied to claim 1 above, and further in view of Ban et al. (US 6350536) and Gilbert (US 2003/0170506).

Regarding claim 24, the teachings of Mathias, Busenbender, and Suzuki as discussed above are herein incorporated. Mathias further discloses a fuel cell stack (2:63-64) and an inlet and an outlet to the membrane electrode assembly (Figure1) with a sensor but is silent towards having a first and second sensor at the inlet and outlet respectively.

Ban et al. teaches a humidity sensor (23) placed at the inlet of the fuel cell to detect the wet condition of the processed air at the vicinity of the inlet of the fuel cell to provide a detection signal for when the compressor can be stopped (4:9-14). It would

have been obvious to one of ordinary skill in the art at the time of the invention to apply Ban inlet placement of the humidity sensors in the fuel cell of Mathias as modified by Busenbender and Suzuki for the benefit of knowing when target humidity has been reached at the inlet of the fuel cell.

Gilbert teaches a humidity sensor placed (48) at the outlet of the fuel cell to detect the wet condition of the exhaust gases at the vicinity of the outlet of the fuel cell [0017, 0018] to gauge the operating conditions of the fuel cell. It would have been obvious to one of ordinary skill in the art at the time of the invention to apply Gilbert's outlet sensor in the fuel cell of Mathias as modified by Busenbender and Suzuki for the benefit of gauging the operating conditions of the fuel cell. It would further have been obvious to one of ordinary skill in the art at the time of the invention to apply Gilbert's outlet placement of the humidity sensors in combination with the inlet humidity sensor of Ban and further in combination with the controller for the fuel cell of Mathias as modified by Busenbender, and Suzuki for the benefit of knowing when to stop the supply of moisture-adjusted gas as determined by the inlet and out sensors to know when the target humidity has been reached and to know the operating conditions of the fuel cell.

***Contact/Correspondence Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kwang Han whose telephone number is (571) 270-5264. The examiner can normally be reached on Monday through Friday 8:00am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on (571) 272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. H./
Examiner, Art Unit 1727

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795